TETRA TECH BAS
GEOSCIENCE

Project No. RKA 18-37E
July 12, 2018

Mr. David Gilbertson
RKA Consulting Group
398 S. Lemon Creek Drive, Suite E
Walnut, CA 91789-2649

Subject: **GEOLOGY AND GEOTECHNICAL ENGINEERING REVIEW**
PROPOSED WEST PARCEL PROJECT
Grading and Landslide Restoration
Mt. San Antonio College
Walnut, California

Reference: Geotechnical Study Report, Proposed West Parcel Project, Grading and Landslide Restoration; Mt. San Antonio College, Walnut, California. Prepared by Converse Consultants, dated May 22, 2018. Converse Project No. 18-31-110-01.

Dear Mr. Gilbertson:

Per your request and on behalf of the City of Walnut, Tetra Tech BAS GeoScience has reviewed the referenced Geotechnical Study Report prepared by Converse Consultants (Converse) dated May 22, 2018 for the proposed West Parcel Project. The submitted Geotechnical Study Report is considered technically insufficient to support the approval of the submitted grading plan. The following review comments need to be addressed prior to approval of the submitted geotechnical study report and grading plan.

REVIEW COMMENTS

GEOLOGIC CONDITIONS

1. Groundwater (pp. 11): Please describe the historical high groundwater conditions at the site.

FAULTING AND SEISMIC HAZARDS

2. Liquefaction and Seismically-induced Settlement (pp. 16): The reviewer agrees with the general conclusions obtained in the report. However, the liquefaction evaluation needs to be based on the historical high groundwater level at the site.
3. Borehole diameter coefficient should be 1.0 instead of 1.15 used in lqiefaction analyses.
4. Boring LB-1, reportedly performed by Leighton & Associates in June 2017 and used for liquefaction analysis, is not provided. Please include the boring log for LB-1 in Appendix A.

SEISMIC ANALYSIS

5. Table No.2 should refer to 2016 CBC (pp. 19).
6. Site-specific ground motion response spectra should be developed using the NGA-West2 ground motion models (pp. 19).

SLOPE STABILITY ANALYSES

In the Executive Summary section (pp. v), Converse reported that unstable, loose, and broken landslide are present in the road cut above Grand Avenue, and threaten the road with slope instability and sudden ground movement. However, the slope stability analyses for the existing condition of the slopes at cross sections C-C' and D-D' underlain by the landslide materials indicate Factors of Safety in excess of 1.55, which would be considered stable. This incompatibility between the discussion of the adverse landslide conditions and the results of slope stability analyses strongly suggests that the geologic models on the cross sections and/or the adopted shear strength parameters are incorrect, and likely unconservative, and should be reconsidered for the slope stability analyses. Specific comments related to the geologic models, shear strength parameters, and slope stability analyses are presented below.

Geologic Models

7. The geologic structure reported in BA-1 consistently show into-slope bedding dips, except at a depth of 39 feet. The into-slope dips are not reflected on the geologic interpretation shown on cross section A-A'. Please explain this apparent discrepancy and revise cross section A-A' as necessary.
8. The geologic structure recorded in the 4 test pits is not shown on the Geologic Map and on the cross sections that cut through the test pits. Please update the Geologic Map and cross sections to include the bedding attitudes measured below the landslide deposits. Note that cross section C-C' cuts through TP-3 and not through TP-2 as labelled on the cross section.
9. The geologic conditions in the bottom of the shear keys and at the toe of the proposed fill slopes have not been adequately investigated and are poorly understood for cross sections A-A', B-B', C-C', E-E', and F-F'. The following specific concerns should be addressed.
    - A-A' and B-B': the depth of alluvial cleanout was not determined based on BH-2.
    - C-C': Per Comment No. 7, the geology encountered in TP-3, consisting of out-of-slope dipping weak, soft siltstone, claystone and sandstone, should be included and considered in the stability analyses.
    - E-E': Per Comment No. 7, the geology encountered in TP-4, consisting of out-of-slope dipping weak, soft siltstone, claystone and sandstone, should be included and considered in the stability analyses.
    - F-F': There is limited subsurface data projected from BA-4 to assist with interpretation of the toe conditions. Consider an additional boring in this area.

Shear Strength Parameters

10. Shear strength parameters selected for bedrock materials presented in Table No. 7 should be substantiated with results of laboratory testing. Results of direct shear testing for samples collected in 2018 are missing in Appendix C.
11. The stability analyses considered anisotropic conditions for bedrocks including cross-bedding and along-bedding shear strength accordingly. It appears that the peak shear strength obtained from the laboratory testing was assumed to be the across-bedding strength, while the residual strength from the laboratory testing was used as the along-bedding strength. The along-bedding strength should not be confused with the residual shear strength. The along-bedding strength is generally obtained either by direct shear testing of samples aligned with the bedding or preferably and more easily by correlations developed by Stark and Hussain (2013) of samples from the fine-grained siltstone and claystone units. Selection of shear strength parameters (peak, residual, fully softened) for the slope stability analyses should strictly follow the recommended procedures in SP117 (SCEC, 2002). Typically, the along-bedding strength for Puente Formation bedrock is expected to be about 12 to 14 degrees with low cohesion. The along-bedding strength for the bedrock materials appears too high in the analyses. Please reconsider the along-bedding strength for bedrock materials.

Stability Analyses

12. A backcut and stabilization fill are proposed for the slopes located in the northwest portion of the site. No stability analyses of the temporary backcut slope have been provided. Please present temporary stability analyses of the proposed backcut as depicted on cross section A-A'. The effects of the proposed backcut on the adjacent private residences should be evaluated.
13. Stability analyses on cross sections C-C' and D-D' for existing conditions should be performed along the interpreted slip surface of the historical landslide with the residual shear strength parameters. The stability analyses presented in the report appear incorrect.
14. Seismic slope stability was evaluated using the pseudo-static approach with a seismic coefficient of 0.15g. The pseudo-static slope stability needs to be performed in accordance with the procedures outlined in SP117A "Guidelines for Evaluating and Mitigating Seismic Hazards in California (California Geological Survey, 2008). Screening analyses for the site-specific seismic demand and/or Newmark-type displacement analyses of the slope are required.
15. It is understood that a search routine for non-circular slip surfaces was utilized in the analyses. It is suggested that because of the optimistically high along-bedding strength and the limited range of bedding orientations utilized in the slope stability analyses, more critical slip surfaces than those identified and presented in the analyses exist. Specially, the non-circular slip surfaces are expected to more closely follow the weak bedding directions.
16. Analyses that show the proposed fill have the numerous slip surfaces covering the material boundaries. Although it is certainly beneficial to see the range of considered slip surfaces, is it possible to also present outputs that also show the material boundaries?
17. The unit weight for bedrock materials used in the analyses varied from 91 to 93 pcf, which based on review of the dry density data from the borings appears very low. In fact, the average dry density value for Tscs is about 109 pcf and the average dry density for Tscg is 106 pcf.

Please reconsider the selected unit weight for bedrock materials and update the stability analyses as required.

18. For the anisotropic model of bedrock, the dip angle was assumed to vary in a relatively narrow range (e.g., for cross section, the dip angle varied from 18 to 20 degrees). Use of a larger range for dip angle is needed to capture the likely range of field conditions.
19. Please provide the legend / convention how the bedding angles in bedrock are oriented in the model setup.
20. Please justify the placement of Mirafi HP570 fabric or equivalent product within the landslide removal areas. The slope stability analyses results for cross sections C-C' and D-D' indicated a minimal increase in factors of safety by placement of the geofabric. The reinforcement zone appears not to be in areas where it can improve the stability. What is the reason / rationale for placement of reinforcing geofabric?
21. Please explain why geofabric is not recommended to be placed in the higher fill slopes depicted on cross sections F-F' and G-G'.

GEOTECHNICAL EVALUATION AND CONCLUSIONS

22. Please describe the potential impact of the proposed grading on the adjacent 20-inch diameter high-pressure gas line. Provide recommendations on protection measures if the high-pressure gas line remains in place. Specifically consider the measures for seismically-induced displacement.
23. Long term consolidation settlement of the proposed fill pad was reported to be less than 1.5 inches. Please include settlement calculations in the report.

PRELIMINARY DESIGN RECOMMENDATIONS

24. The R-value of 44 used for flexible pavement design may be too high for the on-site soils. We understand that laboratory testing on one sample measured a R-value of 44. However, use of a R-value above 40 needs to be strongly justified.
25. Please provide preliminary recommendations for concrete slab-on-grade.

CLOSURE

We appreciate the opportunity to assist the City of Walnut with this review process. Should you have any questions, please feel free to contact our office.

Respectfully Submitted,
Tetra Tech BAS GeoScience

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